

In re Application of:
Sundararajan et al.
Application No.: 10/705,389
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PATENT
Atty Docket No.: INTEL1480-2 (P13833X)

Amendments to the Claims

Please amend claims 1, 5, 6, 15, 16, and 20 as indicated in the listing of claims.

Please cancel claims 2, 3 and 21 without prejudice or disclaimer.

The listing of claims will replace all prior versions, and listings of claims in the application

Listing of Claims:

Claim 1. (Currently Amended) A method comprising:

- a) attaching one or more template nucleic acid molecules to one or more structures;
- b) synthesizing one or more complementary nucleic acids from labeled nucleotides;
- c) detecting changes in a surface stress property of the structures;
- d) identifying the incorporated nucleotides from the changes in a the surface stress property of the structures; and
- e) determining the sequence of the template nucleic acid.

Claim 2. (Currently Cancelled)

Claim 3. (Currently Cancelled)

Claim 4. (Original) The method of claim 1 wherein the structures are cantilevers.

Claim 5. (Currently Amended) The method of claim 1, wherein the changes in a the surface stress property of the structures are detected by optical beam detection, piezoelectric detection, piezoresistance detection or electrical resistance detection.

Claim 6. (Currently Amended) The method of claim 1, wherein the changes in the surface stress property of the structures are detected by changes in the resonant frequency of the structures or in the resistance of an electrical circuit associated with the structure.

Claim 7. (Original) The method of claim 1, wherein the labeled nucleotides comprise at least one mass labeling group.

Claim 8. (Original) The method of claim 7, wherein each different type of nucleotide comprises a distinguishable mass labeling group.

Claim 9. (Original) The method of claim 7, wherein the mass labeling groups are selected from the group consisting of nanoparticles, nanoparticle aggregates, carbon nanotubes, fullerenes, functionalized fullerenes, quantum dots, dendrimers, organic molecules, polymers, heavy atoms, fluorescent labels, luminescent labels and mass spectroscopic labels.

Claim 10. (Original) The method of claim 1, further comprising hybridizing primers to the template nucleic acids.

Claim 11. (Original) The method of claim 10, wherein the labeled nucleotides are covalently attached to the 3' end of the primer by a polymerase.

Claim 12. (Original) The method of claim 1, wherein the template nucleic acid molecules are arranged on part of the surface of the structures in a selected pattern.

Claim 13. (Original) The method of claim 1, wherein only a single type of nucleotide is exposed to the template and complementary nucleic acids at one time.

Claim 14. (Original) The method of claim 8, wherein four different types of nucleotides are exposed to the template and complementary nucleic acids at the same time.

Claim 15. (Currently Amended) A method for nucleic acid analysis comprising:

- a) attaching at least one template nucleic acid to one or more structures;
- b) synthesizing at least one complementary nucleic acid segment comprising a selected number of labeled nucleotides;
- c) detecting changes in a surface stress property of the structures upon incorporation of the labeled nucleotides; and
- d) determining the sequence of the nucleic acid segment from the changes in the surface stress property of the structures.

- Claim 16. (Currently Amended) The method of claim 15, further comprising:
- e) replacing the labeled nucleotides in the complementary nucleic acid segment with unlabeled nucleotides;
 - f) synthesizing an adjacent complementary nucleic acid segment comprising a selected number of labeled nucleotides;
 - g) detecting changes in a surface stress property of the structures upon incorporation of the labeled nucleotides; and
 - h) determining the sequence of the adjacent complementary nucleic acid segment.

Claim 17. (Original) The method of claim 16, further comprising repeating (e) through (h) until a nucleic acid sequence is obtained.

Claim 18. (Original) The method of claim 16, wherein the labeled nucleotides are replaced with unlabeled nucleotides by removing the labels from the labeled nucleotides.

Claim 19. (Original) The method of claim 15, wherein the structures are cantilevers.

Claim 20. (Currently Amended) The method of claim 19, wherein the change in the surface stress property of the structures is determined by detecting a deflection of the cantilevers, a resonant frequency of the cantilevers or the resistance of an electrical circuit associated with the cantilevers.

Claim 21. (Currently Cancelled)

Claim 22. (Original) The method of claim 20, wherein a deflection of the cantilevers, a shift in the resonant frequency of the cantilevers or a change in the resistance of an electrical circuit associated with the cantilevers is a function of the surface stress of the cantilever.

Claim 23. (Original) The method of claim 15, wherein the template nucleic acids are arranged on part of the surface of the structures in a selected pattern.

Claim 24. (Original) An apparatus comprising:

- a) an analysis chamber containing one or more structures;
- b) one or more reagent reservoirs in fluid communication with the analysis chamber;
- c) a detection unit operably coupled to the structures; and
- d) a data processing and control unit.

Claim 25. (Original) The apparatus of claim 24, further comprising one or more nucleic acids attached to the structures.

Claim 26. (Original) The apparatus of claim 25, further comprising one or more polymerases in the analysis chamber.

Claim 27. (Original) The apparatus of claim 24, wherein the structures are cantilevers.

Claim 28. (Original) The apparatus of claim 24, wherein the detection unit comprises a position sensitive photodetector, a piezoelectric detector or a piezoresistor.

Claim 29. (Original) The apparatus of claim 24, wherein the detection unit comprises a laser.

Claim 30. (Original) The apparatus of claim 25, said detection unit to detect changes in mass of nucleic acids attached to said structures and/or the surface stress of said structures.

Claim 31. (Original) An apparatus comprising:

- a) an analysis chamber containing at least one cantilever;
- b) one or more nucleic acids molecules attached to the at least one cantilever;
- c) a detection unit to detect deflection of the at least one cantilever; and
- d) a data processing and control unit.

Claim 32. (Original) The apparatus of claim 31, further comprising an information processing and control system.

Claim 33. (Original) The apparatus of claim 32, wherein the information processing and control system is a computer.

Claim 34. (Original) The apparatus of claim 31, wherein the detection unit comprises a laser and a position sensitive photodetector.

Claim 35. (Original) The apparatus of claim 31, wherein the detection unit comprises a piezoelectric detector, a piezoresistive detector or a piezomagnetic detector.

Claim 36. (Original) The apparatus of claim 31, wherein the nucleic acids molecules comprise a template from about 10 to approximately 100, 000 nucleotides in length.

Claim 37. (Original) The apparatus of claim 31, further comprising an array of cantilevers, each associated with the same molecule.

Claim 38. (Original) The apparatus of claim 31, further comprising an array of cantilevers, each associated with a different molecule.

Claim 39. (Original) An apparatus comprising:

- a) an analysis chamber containing at least one cantilever;
- b) one or more nucleic acids molecules attached to the at least one cantilever;
- c) a piezoresistive resistor embedded at the fixed end of at least one cantilever;
- d) a detection unit to detect deflection of the at least one cantilever; and
- e) a data processing and control unit.

Claim 40. (Original) The apparatus of claim 39, further comprising a resistance measuring device.

Claim 41. (Original) The apparatus of claim 39, wherein the nucleic acids molecules comprise a template from about 10 to approximately 100, 000 nucleotides in length.

Claim 42. (Original) An apparatus comprising:

- a) an analysis chamber containing at least one cantilever;
- b) the at least one cantilever coated with a substance;
- c) one or more nucleic acids molecules associated with the at least one cantilever;
- d) one or more polymerases in the analysis chamber;

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- e) a detection unit to detect deflection of the at least one cantilever; and
- f) a data processing and control unit.

Claim 43. (Original) The apparatus of claim 42, wherein the substance comprises an alloy.

Claim 44. (Original) The apparatus of claim 43, wherein the alloy is gold.

Claim 45. (Original) The apparatus of claim 41, wherein the nucleic acids molecules are anchored to the cantilever through a thiol group.